

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.

35.C14380

First Named Inventor or Application Identifier

TOSHIYUKI NAKAGAWA

Express Mail Label No.

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO:

Assistant Commissioner for Patents
Box Patent Application
Washington, DC 20231

1. ☐ Fee Transmittal Form
(Submit an original, and a duplicate for fee processing)

2. ☒ Specification Total Pages **31**

3. ☒ Drawing(s) (35 USC 113) Total Sheets **05**

4. ☒ Oath or Declaration Total Pages **01**

a. ☒ Newly executed (original or copy)

b. ☐ Unexecuted for information purposes

c. ☐ Copy from a prior application (37 CFR 1.63(d))
(for continuation/divisional with Box 17 completed)
[Note Box 5 below]

i. ☐ **DELETION OF INVENTOR(S)**
Signed Statement attached deleting
inventor(s) named in the prior application, see
37 CFR 1.63(d)(2) and 1.33(b).

5. ☐ Incorporation By Reference (useable if Box 4c is checked)
The entire disclosure of the prior application, from which a copy of
the oath or declaration is supplied under Box 4c, is considered as
being part of the disclosure of the accompanying application and is
hereby incorporated by reference therein.

6. ☐ Microfiche Computer Program (Appendix)

7. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)

a. ☐ Computer Readable Copy

b. ☐ Paper Copy (identical to computer copy)

c. ☐ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. ☒ Assignment Papers (cover sheet & document(s))

9. ☐ 37 CFR 3.73(b) Statement (when there is an assignee) ☐ Power of Attorney

10. ☐ English Translation Document (if applicable)

11. ☐ Information Disclosure Statement (IDS)/PTO-1449 ☐ Copies of IDS Citations

12. ☐ Preliminary Amendment

13. ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)

14. ☐ Small Entity Statement(s) ☐ Statement filed in prior application
Status still proper and desired

15. ☐ Certified Copy of Priority Document(s)
(if foreign priority is claimed)

16. ☐ Other: _____

17. If a CONTINUING APPLICATION, check appropriate box and supply the requisite information:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No. _____

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05514

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CLAIMS	(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) CALCULATIONS
	TOTAL CLAIMS (37 CFR 1.16(c))	36-20 =	16	X \$ 18.00 =	\$ 288.00
	INDEPENDENT CLAIMS (37 cfr 1.16(b))	6-3 =	3	X \$ 78.00 =	\$ 234.00
	MULTIPLE DEPENDENT CLAIMS (if applicable) (37 CFR 1.16(d))			\$260.00 =	\$ 0.00
				BASIC FEE (37 CFR 1.16(a))	\$ 690.00
			Total of above Calculations =		\$1,212.00
	Reduction by 50% for filing by small entity (Note 37 CFR 1.9, 1.27, 1.28).				
	TOTAL =				\$1,212.00

19. Small entity status

- a. ☐ A Small entity statement is enclosed
b. ☐ A small entity statement was filed in the prior nonprovisional application and such status is still proper and desired.
c. ☐ Is no longer claimed.

20. ☒ A check in the amount of \$1,212.00 to cover the filing fee is enclosed.21. ☒ A check in the amount of \$40.00 to cover the recordal fee is enclosed.

22. The Commissioner is hereby authorized to credit overpayments or charge any deficiencies in the following fees to Deposit Account No. 06-1205:

- a. ☒ Fees required under 37 CFR 1.16.
b. ☒ Fees required under 37 CFR 1.17.
c. ☐ Fees required under 37 CFR 1.18.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

NAME

LEONARD P. DIANA, Reg. No. 29,296

SIGNATURE



DATE

March 28, 2000

BACKGROUND OF THE INVENTION

5 The present invention relates to an information processing apparatus and method and, more particularly, to an information process for protecting the intellectual property right of input data.

10 In recent years, as a method of transmitting a
single bitstream by combining multimedia data
containing a plurality of objects such as motion image
data, audio data, and the like, so-called MPEG-4
(Moving Picture Experts Group Phase 4) is standardized.

20 The aforementioned MPEG-4 datastream has a
function of independently transmitting/receiving many
video scenes and video objects on a single stream
unlike in a conventional multimedia stream. As for
audio data, many objects can be similarly restored from
25 a single stream. That is, the MPEG-4 data stream
contains BIFS (Binary Format for Scenes) that modifies
VRML (Virtual Reality Modeling Language) as information

process, and contain desired motion image data and audio data. Upon decrypting the encrypted data or authentication using the digital watermark, copyright protection is assured by limiting the number of times of copying of data or inhibiting a given object from being edited with other objects.

In this manner, the receiver decodes and plays back the received multimedia data after decryption or authentication using the digital watermark.

10 However, when copyright information is embedded as a digital watermark in multimedia data to protect the copyright, that copyright information embedded in the multimedia data cannot be extracted until the multimedia data is decoded.

15 Decryption can be done before the multimedia data is decoded. However, authentication of the digital watermark can be done only after the multimedia data is decoded. For this reason, the playback control of multimedia data protected by the copyright information must be able to cope with encryption or digital
20 watermarking.

SUMMARY OF THE INVENTION

25 Under the circumstances, it is an object of the present invention to provide an information processing apparatus and method which can reliably control playback of information data to protect the

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intellectual property right involved even when the intellectual property information has undergone an encryption process or the intellectual property information is embedded in the information data as a digital watermark to protect the intellectual property right.

In order to achieve the above object, an information processing method/apparatus according to one preferred embodiment of the present invention is an information processing method/apparatus for demultiplexing object streams from a datastream which includes a plurality of object streams each having predetermined information, and decoding, synthesizing, and outputting the object streams, wherein the object streams are authenticated, and whether or not the playback control of a predetermined object stream is done before or after decoding of the predetermined object stream is determined in accordance with an authentication method and the authentication result.

Also, an information processing method/apparatus according to another preferred embodiment of the present invention is an information processing method/apparatus for demultiplexing object streams from a datastream which includes a plurality of object streams each having predetermined information, scene description information for synthesizing information contained in the plurality of object streams, and

management information for managing a copyright of the information, playing back each information, and synthesizing and outputting the information on the basis of the scene description information, wherein at least one object stream is authenticated on the basis of the management information, and whether the playback control of the object stream is done before or after decoding of the object stream is determined in accordance with an authentication method and the authentication result.

Furthermore, an information processing method/apparatus according to another preferred embodiment of the present invention is an information processing method/apparatus wherein encoded information data, and management data used to protect an intellectual property right of the information data are input, an authentication method for the information data is discriminated on the basis of the management data, and whether the playback control of the encoded information data is done before or after decoding of the information data is controlled in accordance with a discrimination result of the discrimination step.

Other objects, features and advantages of the invention will become apparent from the following detailed description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing the arrangement of the overall information processing apparatus according to an embodiment of the present invention;

5 Fig. 2 is a block diagram showing the arrangement of an IPMP control unit 20 according to the embodiment of the present invention;

Fig. 3 is a flow chart for explaining the operation of the IPMP control unit 20 according to the embodiment of the present invention;

Fig. 4 is a flow chart for explaining the operation of a motion image decoding circuit 17 according to the embodiment of the present invention;

Fig. 5 is a timing chart for explaining the concept of operations upon permitting motion image playback in the processing according to the embodiment of the present invention; and

Fig. 6 is a timing chart for conceptually explaining the operations upon inhibiting motion image playback in the processing according to the embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The preferred embodiment of the present invention will be described in detail hereinafter with reference to the accompanying drawings.

Fig. 1 is a schematic block diagram showing the

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arrangement of an MPEG-4 player according to an embodiment of the present invention.

Referring to Fig. 1, a transmission line 1 is represented by various networks, and is a network on which an MPEG-4 bitstream is distributed in this embodiment. Note that the transmission line of this embodiment includes, e.g., a storage medium itself such as a magnetic tape, hard disk, DVD-RAM, or the like in addition to a so-called communication line.

In the apparatus of this embodiment, upon receiving an MPEG-4 bitstream distributed from the network or played back from the storage medium, the received MPEG-4 bitstream is input to a demultiplexer 2. The demultiplexer 2 demultiplexes the received MPEG-4 bitstream into scene description data including graphic data, audio object data, motion image object data, object description data, and the like, which are respectively input to sync. layer processing circuits 3 to 6.

Note that the audio object data has undergone high-efficiency (compression) coding such as known CELP (Code Excited Linear Prediction) coding, TWINVQ (Transform domain Weighted INTERleave Vector Quantization) coding, or the like. The motion object data has undergone high-efficiency coding by, e.g., known MPEG-2, H.263, or the like. Also, the object description data contains, e.g., animation, or the

like, and is similarly encoded in a format suitable for each description data.

Since the scene description data including graphic data, audio object data, motion image object data, object description data, and the like, which are synchronized by the sync. layer processing circuits 3 to 6 in accordance with time information called a time stamp appended to the bitstream, have undergone coding such as high-efficiency (compression) coding, and the like, as described above, they are decoded by decoding circuits 15 to 18 in units of objects.

Since this embodiment assumes an apparatus capable of decoding even when an MPEG-4 bitstream contains objects of two different types for each of audio object, motion image object and object description data, two sync. layer processing circuits and two decoding circuits are prepared in correspondence with the audio objects, motion image objects, and object description data.

The audio object, motion image object and object description data that have been decoded by the decoding circuits 16, 17, and 18 are supplied to a scene synthesization circuit 30, and a scene is played back and the graphic data is processed on the basis of the scene description information decoded by the decoding circuit 15. A final multimedia data sequence obtained in this manner is supplied to an output equipment 31

as a temporary storage of the CPU 40, and includes an information area 60a for storing information such as command data, time data, and the like, and a program load area 60b for storing programs loaded from an external storage device 70. The external storage device 70 comprises an external storage medium such as a floppy disk, CD-ROM, or the like, and stores programs to be loaded onto the program load area 60b.

An input interface 80 receives IPMP information from the demultiplexer 2 and time information from the sync. layer processing circuits 4 to 6. An output interface 90 outputs an access point control signal to the access points 10 to 12, and a decoding circuit control signal to the decoding circuits 16 to 18.

In this embodiment, the IPMP control unit 20 is depicted as an independent processor element. Alternatively, some or all functions of the MPEG-4 player may be controlled by the CPU 40 or may be implemented by software, as is known to those who are skilled in the art.

The operation of the MPEG-4 player according to this embodiment, especially, operation using IPMP information, will be described in detail below with reference to the flow charts shown in Figs. 3 and 4.

Fig. 3 is a flow chart for explaining the operation of the IPMP control unit 20 when the MPEG-4 player receives an MPEG-4 bitstream. Assume that the

identifying IPMPS_Type in the IPMP information if the copyright information of corresponding motion image data is embedded as a digital watermark in that motion image data.

5 If it is determined in step 202 that the copyright information is embedded as a digital watermark, the flow advances to step 203; otherwise, the flow advances to step 209.

10 In step 203, a startup notice including a requirement of notice after decoding is sent to the motion image decoding circuit 17 to start up the motion image decoding circuit (or to continue its operation), since the motion image data must be decoded and the copyright information embedded as a digital watermark
15 must be extracted. Then, the flow advances to step 204. In step 204, the control waits for a notice indicating completion of the decoding processing. Upon receiving that notice, the flow advances to step 205.

20 In step 205, the copyright information embedded as a digital watermark is extracted from the motion image data decoded by the motion image decoding circuit 17, and authentication is done using the extracted copyright information and the IPMP information corresponding to that motion image data.

25 It is checked in step 206 if authentication has succeeded. If YES in step 206, the control unit notifies the motion image decoding circuit 17 of

does not include any requirement of notice after decoding is sent to the motion image decoding circuit 17 to start up the motion image decoding circuit 17 (or to continue its operation) in step 211. The flow then advances to step 212. On the other hand, if authentication has failed, since motion image data need not be decoded, the flow jumps to step 212.

Fig. 4 is a flow chart for explaining the operation of the motion image decoding circuit 17 when the MPEG-4 player receives an MPEG-4 bitstream. Assume that the format of the MPEG-4 bitstream is the same as that in the case of Fig. 3 above.

Upon receiving the startup notice from the IPMP control unit 20, the motion image decoding circuit 17 decodes a packet of a bitstream of motion image data demultiplexed by the demultiplexer 2 in step 300.

Upon completion of decoding of the packet, the flow advances to step 301 to check if the startup notice which is received from the IPMP control unit 20 includes a requirement of notice after decoding.

As has been explained in the description of Fig. 3, when the copyright information of motion image data is embedded as a digital watermark in the motion image data, since authentication must be done after decoding of the motion image data, the startup notice sent from the IPMP control unit 20 to the motion image decoding circuit 17 includes a requirement of notice

after decoding. On the other hand, when the copyright information of motion image data is not embedded as a digital watermark in the motion image data (i.e., the copyright information is appended by a method other than digital watermarking or no copyright information is appended), since authentication is complete before decoding of the motion image data, the startup notice sent from the IPMP control unit 20 to the motion image decoding circuit 17 does not include any requirement of notice after decoding.

In this case, if the startup notice received from the IPMP control unit 20 includes a requirement of notice after decoding, the flow advance to step 302; otherwise, the processing ends.

In step 302, the decoding circuit 17 notifies the IPMP control unit 20 of completion of motion image decoding, and the flow advances to step 303. Upon receiving the notice, the IPMP control unit 20 executes authentication in step 205 described above.

In step 303, the decoding circuit 17 waits for a notice of completion of authentication from the IPMP control unit 20. If it is determined in step 206 described in Fig. 3 that authentication has succeeded, since a notice of completion of authentication is issued to the motion image decoding circuit 17 in step 207, a scene synthesis process in the scene synthesization circuit is started in response to that

notice of completion of authentication. However, if it is determined in step 206 that authentication has failed, since no notice of completion of authentication is sent to the motion image decoding circuit 17, the operation of the motion image decoding circuit 17 halts.

On the other hand, when means that implement the data processing method according to the present invention are provided in the form of a program, since it is a common practice to process streams of audio object data, motion image object data, IPMP information, and the like in independent threads, synchronization must be taken among these threads. In this embodiment, a mechanism such as known semaphores, event flags, and the like is used to synchronize the threads.

For the purpose of better understanding of the operation of this embodiment, the operations of this embodiment will be conceptually explained below using the timing charts shown in Figs. 5 and 6.

Fig. 5 is a timing chart when authentication using copyright information embedded as a digital watermark in motion image data has succeeded.

In this case, an IPMP thread manages threads for processing data corresponding to IPMP information. Therefore, when IPMP information is appended to a motion image object, the operation of a motion image

decoding thread (to be referred to as a video thread hereinafter) is controlled by the IPMP thread.

Upon receiving the IPMP information corresponding to motion image packet data in which copyright
5 information is embedded as a digital watermark, the IPMP thread starts up the video thread, which performs decoding of the motion image data.

Upon completion of decoding, the video thread sends a notice of decoding completion to the IPMP
10 thread.

The IPMP thread executes authentication using the copyright information embedded as a digital watermark, which can be extracted after decoding, and the IPMP information. When authentication has succeeded and
15 playback of that motion image object is permitted, the IPMP thread sends a notice of authentication completion to the video thread. Upon receiving the notice, the video thread restarts operation and supplies decoded motion image data to the scene synthesization circuit,
20 thus allowing to play back the motion image data.

Fig. 6 is a timing chart when authentication using copyright information embedded as a digital watermark in motion image data has failed.

In the timing chart shown in Fig. 6, when the
25 authentication in the IPMP thread has failed and playback of the motion image object is inhibited unlike in Fig. 5, no notice of authentication completion is

code, for example, a floppy disk, hard disk, optical disk, magneto-optical disk, CD-ROM, CD-R, magnetic tape, nonvolatile memory card, ROM, and the like may be used.

5 The functions of the above-mentioned embodiments may be implemented not only by executing the readout program code by the computer but also by some or all of actual processing operations executed by an OS (operating system) running on the computer on the basis
10 of an instruction of the program code.

Furthermore, the functions of the above-mentioned embodiments may be implemented by some or all of actual processing operations executed by a CPU or the like arranged in a function extension board or a function
15 extension unit, which is inserted in or connected to the computer, after the program code read out from the storage medium is written in a memory of the extension board or unit.

When the present invention is applied to the
20 storage medium, the storage medium stores program codes corresponding to the above-mentioned flow charts. That is, program codes that include modules stored in the external storage device 70 shown in Fig. 2 are stored in the storage medium.

25 As described above, according to the above embodiment, upon demultiplexing and playing back object streams from a datastream that contains a plurality of

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object streams each having predetermined information,
playback control of object data protected by copyright
information can be done not only before decoding of the
data but also after decoding, and more flexible
5 copyright authentication can be achieved.

Especially, whether or not playback control of the
object data is done before or after decoding of the
data can be determined based on if copyright
information is embedded in the object data as a digital
10 watermark.

In other words, the foregoing description of
embodiments has been given for illustrative purposes
only and not to be construed as imposing any limitation
in every respect.

15 The scope of the invention is, therefore, to be
determined solely by the following claims and not
limited by the text of the specifications and
alterations made within a scope equivalent to the scope
of the claims fall within the true spirit and scope of
20 the invention.

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9. A method according to claim 4, wherein said control step includes a step of controlling playback of the predetermined object stream by managing multi-thread processing in units of streams on the basis of the intellectual property management stream.

10. A computer readable storage medium storing a program of information processing of claim 1.

11. An information processing method for demultiplexing object streams from a datastream which includes a plurality of object streams each having predetermined information, scene description information for synthesizing information contained in the plurality of object streams, and management information for managing a copyright of the information, playing back each information, and synthesizing and outputting the information on the basis of the scene description information, comprising:

a) an authentication step of authenticating at least one object stream on the basis of the management information; and

b) a control step of controlling playback of the object stream in accordance with an authentication result of said authentication step,

wherein said control step includes a step of determining in accordance with an authentication method

whether the playback control is done before or after decoding of the object stream.

12. A computer readable storage medium storing a
5 program of information processing of claim 11.

13. An information processing apparatus for demultiplexing object streams from a datastream which includes a plurality of object streams each having
10 predetermined information, and decoding, synthesizing, and outputting the object streams, comprising:

a) authentication means for authenticating the object streams; and

b) control means for controlling playback of the
15 object streams in accordance with an output from said authentication means,

wherein said control means determines in accordance with an authentication method whether or not the playback control is done before or after decoding
20 of a predetermined object stream.

14. An apparatus according to claim 13, wherein information in the predetermined object stream has undergone high-efficiency coding.

25

15. An apparatus according to claim 14, wherein said control means controls playback of the

predetermined object stream by stopping or executing decoding of the information that has undergone high-efficiency coding.

5 16. An apparatus according to claim 13, wherein said control means controls playback of the predetermined object stream in accordance with an intellectual property management stream contained in the plurality of object streams.

10 17. An apparatus according to claim 16, wherein said authentication means authenticates the predetermined object stream in accordance with the intellectual property management stream.

15 18. An apparatus according to claim 17, wherein said authentication means determines in accordance with a type of the intellectual property management stream whether the authentication is done before or after
20 decoding of the predetermined object stream.

 19. An apparatus according to claim 17, wherein said authentication means determines whether the authentication is done before or after decoding of the
25 predetermined object stream, depending on whether or not inherent intellectual property information used in authentication is embedded in the predetermined object

wherein said control means determines in accordance with an authentication method whether the playback control is done before or after decoding of the object stream.

5

23. An information processing method comprising:

a) an input step of inputting encoded information data, and management data used to protect an intellectual property right of the information data;

10 b) a discrimination step of discriminating an authentication method for the information data on the basis of the management data; and

c) a control step of making playback control of the encoded information data,

15 wherein said control step includes a step of controlling in accordance with a discrimination result of the discrimination step whether the playback control in the control step is done before or after decoding of the information data.

20

24. A method according to claim 23, wherein the information data is a datastream containing a plurality of object streams each having predetermined information.

25

25. A method according to claim 24, wherein the datastream complies with MPEG-4 standards.

26. A method according to claim 25, wherein the management data is IPMP data complying with the MPEG-4 standards.

28. A method according to claim 23, wherein the information data is audio data.

29. A method according to claim 23, wherein said discrimination step includes a step of discriminating if authentication is done using a digital watermark.

a) input means for inputting encoded information data, and management data used to protect an intellectual property right of the information data;

c) control means for making playback control of the encoded information data,

FIG. 1

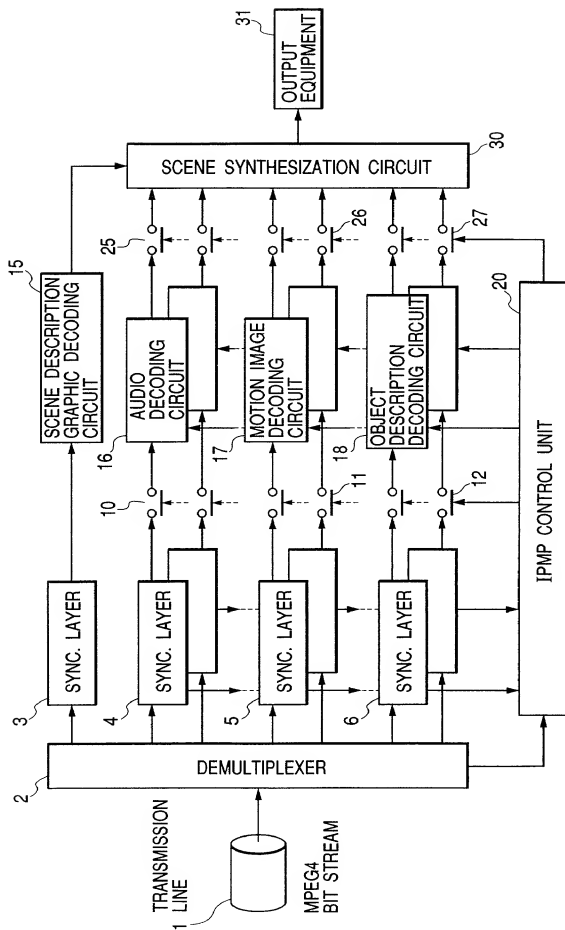
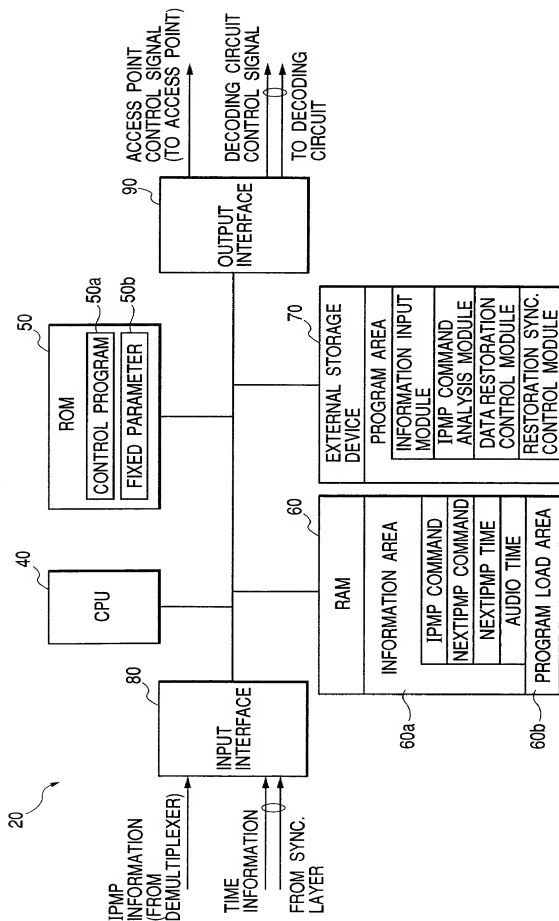


FIG. 2



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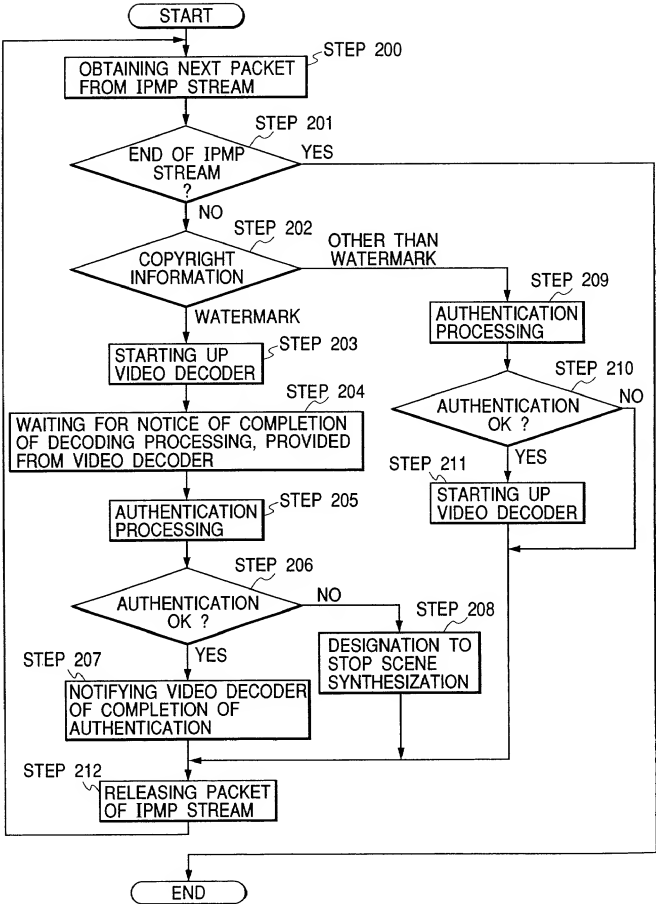


FIG. 4

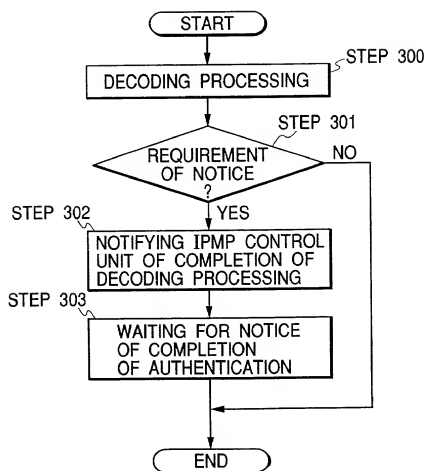
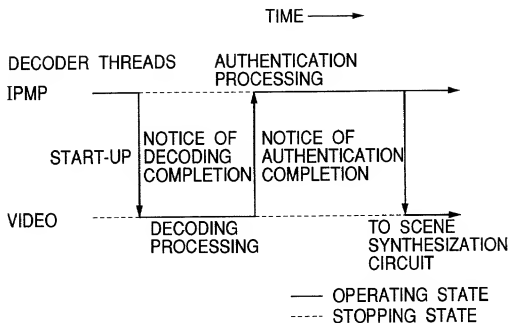
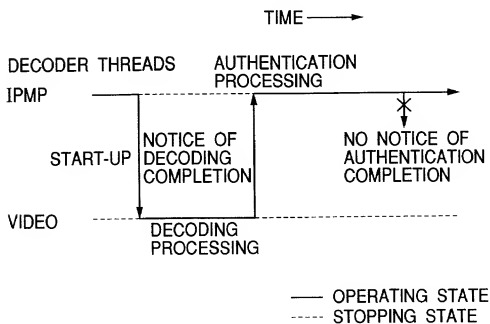


FIG. 5**FIG. 6**

**COMBINED DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATION
(Page 1)**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled _____

INFORMATION PROCESSING APPARATUS AND METHOD

the specification of which ☒ is attached hereto ☐ was filed on _____ as United States Application
No. or PCT International Application No. _____
and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR §1.56.

I hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or §365(b), of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT international application which designates at least one country other than the United States, listed below and have also identified below any foreign application for patent or inventor's certificate, or PCT international application having a filing date before that of the application on which priority is claimed:

Country	Application No.	Filing (Day/Mo./Yr.)	(Yes/No) Priority Claimed
JAPAN	11-091562	31 March 1999	Yes

I hereby appoint the practitioners associated with the firm and Customer Number provided below to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith, and direct that all correspondence be addressed to the address associated with that Customer Number:

FITZPATRICK, CELLA, HARPER & SCINTO
Customer Number: 05514

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Full Name of Second Joint Inventor, if any _____

Second Inventor's signature _____

Date _____ Citizen/Subject of _____

Residence _____

Post Office Address _____

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